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Sustainable Transport Futures: Analysis of the Selected Methodologies Supporting the Planning Process towards Achieving Goal 11 Sustainable

Sustainable Transport Futures: Analysis of the Selected Methodologies Supporting the Planning Process Towards Achieving Goal 11 Sustainable Cities and Communities

Varvara Nikulina, Henrikke Baumann, David Simon and Frances Sprei

Abstract

A quarter of energy-related greenhouse gas emissions (GHG) originate from the transportation sector. Continuously increasing demand for transportation services worldwide is one of the main urban challenges addressed by Sustainable Development Goal 11, target 2. One way to address this issue is to develop an integrated transportation system that can ensure confidence and comfort for the passengers. This will contribute not only to the customers' experience but also to operators and authorities through sustainable, cost-effective, and profitable services. Conversely, the lack of such a system or a poorly managed system prevents the economy and society from realizing its potential. In the transition towards sustainability, the planning process of complex systems such as transportation often requires supportive tools and methods, such as futures methodologies that assist decision-making by providing information about possible futures. In today's rapidly changing environment, forecasting tools do not always provide the expected outcomes since it is difficult to predict all the

V. Nikulina (✉)
Strategic Sustainable Development, Blekinge Institute of Technology,
371 79 Karlskrona, Sweden
e-mail: varvara.nikulina@bth.se

V. Nikulina · D. Simon
Mistra Urban Futures, Chalmers University of Technology,
412 96 Gothenburg, Sweden
e-mail: david.simon@chalmers.se

H. Baumann · F. Sprei
Energy and Environment, Chalmers University of Technology,
Maskingränd 2, 412 58 Gothenburg, Sweden
e-mail: henrikke.baumann@chalmers.se

F. Sprei
e-mail: fsprei@chalmers.se

W. Leal Filho (ed.), *Handbook of Sustainability Science and Research*,
World Sustainability Series, https://doi.org/10.1007/978-3-319-63007-6_29

unexpected events. Therefore, there is a demand for alternative methods that not only grasp the constant changes but also create additional value (for example, meeting the needs of multisectoral collaboration and creation of common vision). The present article investigates the usefulness of three such methodologies, namely backcasting, foresighting, and SymbioCity, for the planning process of the bus park and railway station in Kisumu, Kenya, and Centralen in Gothenburg, Sweden. The paper's contribution is a description of the Kenyan transportation system (which has not been studied in detail before), planning process, and pertinent issues related to the stations both in Kisumu and Gothenburg, located in the sharply contrasting contexts of global South and global North, respectively. On the basis of field research, interviews, and feasibility study of futures methodologies, the paper concludes that backcasting is the most suitable of the methodologies for both places, since it can be applied at a small scale, and provides creative solutions and has a high level of integration of stakeholders. Furthermore, the paper examines the application of the futures methodologies in multisectoral urban transitions apart from transportation and draws conclusion on what can be learnt from it.

Keywords
Sustainability · Development · Transition · Transportation · Planning process · Multisectoral collaboration · Current state · Backcasting · Forecasting · Bus park · Railway station · Kisumu · Kenya · Centralen · Gothenburg · Sweden

1 Introduction

Transportation has not always been featured on development priority lists. It was not part of the UN Millennium Goals, but it is included in Agenda 2030's Sustainable Development Goal (SDG) 11: "make cities inclusive, safe, resilient and sustainable". Its Target 11.2 requires all states "by 2030, [to] provide access to safe, affordable, accessible and sustainable transport systems for all, improving road safety, notable by expanding public transport, with special attention to the needs of those in vulnerable situations, women, children, persons with disabilities and older persons" (UN n.d.). The transportation sector has several leverage points that can be influenced. They are closely connected to demographic changes. Factors such as aging population, growth of the middle classes, and increasing integration of women within the labor market increase demand mobility. It is both a challenge and an opportunity for development.

One of the main challenges facing cities worldwide is to meet constantly increasing demand for transportation services. A well-planned public transportation system provides passengers confidence in their daily mobility. Conversely, when the system does not function adequately, neither a city nor its inhabitants can realize their

true economic potential. This is often the case in rapidly growing urban cities such as Nairobi (Daganzo et al. 2007; Becker 2011; Graeff 2013) and Kisumu. At the same time, Gothenburg—which was awarded a Climate City 2015 prize in the Earth Hour City Challenge from Worldwide Fund for Nature (WWF 2015)—faces several transport challenges related to carrying capacity, air pollution, and transition towards a sustainable system (Cullberg et al. 2014). These require an understanding of how the system works, its strengths, weaknesses, and possibilities for improvement.

Aim and Scope

This paper investigates the usefulness of backcasting methodology in the planning process of the bus park and railway station in Kisumu, Kenya, and Centralen in Gothenburg, Sweden, compared to standard forecasting methodologies. Moreover, it examines applications of the futures methodologies in multisectoral urban transitions other than transportation and draws conclusion on what can be learnt from it. Both cities face challenges for transitioning towards sustainability, within which the respective study sites have strategic importance. The paper does not provide full descriptions of the futures methodologies (backcasting, foresighting, SymbioCity approach), which are readily available elsewhere, but concentrates on the main aspects related to their applicability in diverse contexts. Since Gothenburg's planning process and current situation have been studied to a greater extent than Kisumu, special attention is devoted to Kisumu, for which only limited documented data exist.

2 Methodology

Two main themes are investigated: the respective planning processes and current state of the stations in Kisumu and Gothenburg. In order to understand the planning process in Kisumu, learning about Kenya and its transportation, document studies and 13 interviews were conducted. For the Swedish context, a literature study and two interviews were conducted.

To better understand the suitability of the particular futures methodologies (backcasting, foresighting, SymbioCity approach) in the planning process, these were analyzed based on the framework proposed by Baumann and Cowell (1999). Backcasting can be used as a supportive tool in the decision-making process, which with time developed a strong focus on sustainability. Contrary to the other selected methodologies, a backcasting exercise produces a strategy towards achieving the locally defined goal (Holmberg 1998). Moreover, it is recommended as a planning tool by the UN (UN n.d.).

The research process includes the field studies, which require appropriate preparation, implementation, and analysis methods and techniques. Prior to the field studies, the following issues were taken into account: the research ethics (ESRC 2015), field study (Mikkelsen 2005) and positionality (Simmel 1908; Godbole 2014). While in Kenya and Sweden, methods of sociological primary research (Driscoll 2011) were applied: observation (Agar 1980; Scheyvens and Storey 2003;

Kawulich 2005), semistructured interviews (Arksey and Knight 1999; Burton 2000; Flowerdew and Martin 2005), the "snowball" technique (Arksey and Knight 1999; Scheyvens and Storey 2003), and survey (Burton 2000; De Vaus 2013). This was followed by analysis using SWOT (Maylor 2010), stakeholder management (Thompson 2015) and futures methodologies in the planning process (Amara 1991; Dreborg 1996; Baumann and Cowell 1999; Holmberg and Robèrt 2000; Vergragt and Quist 2011; Ranhagen and Groth 2012; Kuosa 2014).

3 Results and Analysis

3.1 Planning Processes in Kisumu and Gothenburg

The planning processes of Kisumu and Gothenburg differ substantially. Due to the small capacity in Kisumu's City Planning Department, most planning services are outsourced to private actors. The standardized procedure defined by the national government is followed (Otieno 2015a, b). Currently, there is one large plan—the *Integrated Strategic Urban Development* (ISUD) plan—that is in the process of being enacted into law in order to ensure the legality of the document and its legal enforceability (KAM 2016). Its main purpose is to guide new investment rather than being a mandatory master plan. Bureaucratic procedures and the reactive approach of the local planners constantly delay the planning process. Lack of long-term vision is another challenge that has to be addressed urgently (Eising 2015; Otieno 2015a).

At the time of the empirical study, work at the railway station was frozen. Nevertheless, on the international level, Kenya Railways has a big developmental project, which also involves Uganda, Burundi, and Rwanda (Mumo 2014). The main aim of the project is to build a standard gauge regional system (since the current one is old, partly destroyed and does not correspond to international standards). The project has two consecutive phases. The first phase involves the Mombasa–Nairobi line (by July 2016, 75% of work was complete), while in the second phase, the railway will continue from Nairobi to Malaba (the border town) through Kisumu. The second phase has been confirmed by the government in 2016, with up to 85% financed by the China Exim Bank and 15% by the Kenyan Government (Mutambo 2016; Mwende 2016).

For the next 15 years, the Kenyan government has picked five priority SDGs for primary development. Goal 11 is not one of them, which means that the transportation sector will remain as a secondary area of interest (Muchangi 2015). In Sweden, every municipality/city decides for itself whether to include the SDGs in their planning or not and which ones are the most appropriate. Gothenburg's Climate City 2015 award, for example, shows local authorities' willingness to work and report on the progress towards achievement of the SDGs (WWF 2015).

As for Sweden, the planning process there is structured and well defined. Considerable attention is devoted to the preparatory stage. Consultations with the

regional state authorities and municipalities are implemented on the early stages; consultations with the citizens on initial proposals are a norm (Larsson 2006). One example of such inclusion is the "Älvstaden" project, which includes big installation displaying the future Gothenburg city center, with the screens on the walls show the past, present, and future development projects (Göteborgs Stad 2015). Gothenburg also has a defined procedure for the planning process (Kain 2015).

One of the largest current projects in Gothenburg is the Västlänken project by Trafikverket (the national traffic and transport authority) (Trafikverket n.d.). It is meant to create a new commuter and regional train connection with three new stops and reduce the number of modal changes required to reach several parts of the city. Further exploration of the projects in Gothenburg is beyond the scope of the current paper.

Development of the transportation sector in Gothenburg forms part of the Transport Strategy for 2035. The plan incorporates a sustainability perspective in its vision. The strategy was developed "in an integrated process with the Development Planning Strategy and the green strategy" (Hellberg and Jonsson 2014). Based on the policies that influence the transport strategy, several small-scale plans are being developed or in progress, i.e., road safety programme (City of Gothenburg 2010b) and bicycle programme, which is in the development stage (July 2016) (Hellberg and Jonsson 2014). In Gothenburg, the planning process faces challenges in terms of collaboration among the large number of stakeholders involved.

Both Gothenburg and Kisumu have a strategic advantage in long-term planning based on their waterside locations. At the same time, the main difference is the perception of time: while Sweden has visions and development plans for 2030, 2050, etc. (City of Gothenburg 2010a, Hellberg and Jonsson 2014, Göteborgs Stad 2015), "in Kenya tomorrow is already (the) future" (Eising 2015).

3.2 Current Situation: Organization of the System, Key Stakeholders, and Pertinent Issues

3.2.1 Kisumu

Kisumu is a national and regional center for trade, commerce, industry, administration, and communication. It was developed as a port and railway terminus due to its strategic location. Kisumu was the connection point for passengers and freight via Lake Victoria and overland to Tanzania, Uganda, Rwanda, and Burundi as well as to the other big Kenyan cities, such as Nairobi and Mombasa. The transportation system in Kisumu is represented by water transport (the lake port and the dry port managed by Kenya Ports Authority), air transport (Kisumu international airport), road transport with a variety of means (boda-boda,[1] piki-piki,[2] tuk-tuk,[3]

[1] *Boda-boda*—usually motorbike taxi, but can be bicycle taxi.
[2] *Piki-piki*—motorbike taxi.
[3] *Tuk-tuk*—motorized scooter taxi with a canopy.

taxi, matatu,[4] long-distance bus), and railway transport (as mentioned before under the large developmental project).

The bus park is a self-evolved unit in Kisumu. It provides mainly short-distance services within and between neighboring counties, but is also served by several long-distance operators. The bus park has no statistical data documented. To grasp the size of the park, based on the assumptions of the city planner and bus park superintendent, and assuming that every *matatu* leaving the park is full in the mid-season (summer), an educated guess would be that about 11,000 people per day travel through the bus park (Otieno 2015a; Rawinji 2015).

At the initiation stage, there was limited planning by the state—mainly provision of designated space. The structure of the bus park involves many actors that have different levels of power to influence the current situation and future development. Figure 1 depicts the system of the bus park that was identified during the field studies. The most decision-making power and ability to influence the current state in the bus park belongs to the government, although transportation is not a governmental service. There is top-down control over the government-owned land. Regulations connected to the services provided by the park are dictated by the National Transport and Safety Authority (NTSA). The service providers are Savings and Credit Co-operatives (SACCOs).[5] In Kisumu, three groups of SACCOs operate within the bus park: the ones that are registered in Kisumu (24 cooperatives), SACCOs of the western region (19 cooperatives) and SACCOs registered in the neighboring county—Kisii. One can see that the number of Kisumu SACCOs represents 1/3 of total SACCOs that are involved in the provision of services at the bus park. It means it is more difficult to influence the situation at the bus park due to the involvement of external stakeholders.

Current demand for services is met, although at first sight, it might not seem so. The SACCOs act reactively and ensure their performance, sometimes with a certain delay. Since there is no future development plan, there are no projections towards future demand and further study is needed.

The main challenges observed at the bus park are sanitation, solid waste, and maintenance of the park (especially drainage system), which often leads to damages of the vehicles. Based on our survey of the SACCOs' representatives, 11 main challenges were identified within the bus park, with the top three being harassment of passengers and vehicles by *touts*[6]*/manambas*,[7] inadequate space (too many vehicles for very limited area), competition with other vehicles (*probox*,[8] *tuk-tuk*, private cars). Overcoming these challenges would be a stepping stone towards achieving SDG 11 Target 2. However, further research on the state of the art of

[4]*Matatu*—minibus with 14 seats on average.
[5]SACCOs can exist in any industry, not only for transportation. In order to become a legal SACCO, a group of individuals has to register at the Ministry of Co-operative Development and Marketing. Usually one SACCO in the transportation sector operates on one route (Graeff 2013).
[6]*Tout*—a person who provides route and stop information to passengers.
[7]*Manamba*—tout who is possibly involved with criminal groups/activities.
[8]*Probox*—model of the car with five seats.

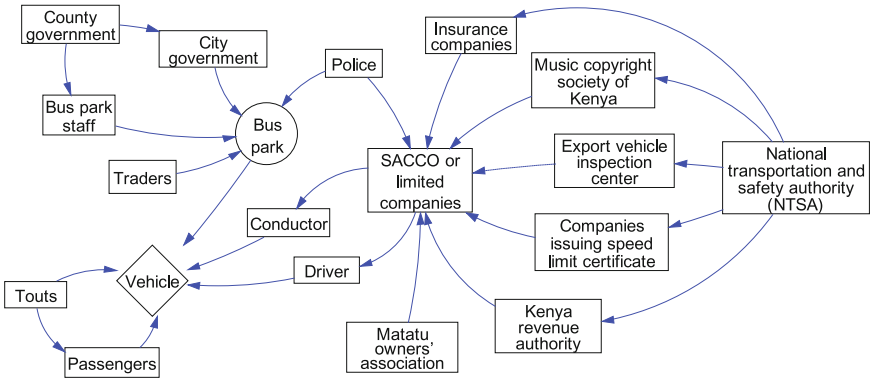

Fig. 1 Bus park system

private services and more detailed investigation on how to meet future needs would be necessary to develop the transition pathway.

The controversial role of *touts* was flagged as a sensitive or important issue by all survey respondents. The *touts* are vital to the operation of SACCOs, providing route and stop information to passengers. The controversy exists partly because many of the *touts* are or were homeless street children and possibly are involved with criminal groups/activities. The methods of coercion used by the *touts* can go beyond what would be considered respectful or appropriate in Europe. This is in part due to the intense competition between SACCOs and the importance of convincing customers to travel with their vehicles. There is thus a negative perception of these *touts*, as customers may feel unsafe due to the threat of physical or other types of harassment. It is controversial to suggest removal of these *touts*, not least due to the difficulty of enforcement, but also due to the important and useful role that they play (information messengers) and the fact that it is a valuable means of employment for people with fewer opportunities.

Several challenges outside the bus park (from the transportation system perspective) were also identified based on the SACCOs' survey. The main three were high taxes, bad roads, and bribery to traffic police ("Corruption from traffic officers is a big problem. Please act immediately!!").

Pertinent issues identified above are not directly related to SDG 11 except for the issue of touts, maintenance and challenges outside of the bus park. That supports the decision of Kenyan's government to give priority to the other SDGs, namely Goal 3 (good health and well-being), Goal 4 (quality education), Goal 5 (gender equality), Goal 8 (decent work and economic growth), Goal 12 (responsible consumption and production), and Goal 13 (climate action) (Muchangi 2015; UN n.d.).

3.2.2 Gothenburg

Centralen Gothenburg is an interchange that combines bus station (the Nils Ericssonterminalen), central railway station and the surrounding territory: city buses, trams, taxis, stores, and a major indoor shopping center. It is a hub that provides

urban, national, regional, and international services. The three main challenges identified at Centralen that make the planning process difficult are large number of actors, lack of cooperation among actors, and the physical state of individual elements of the station.

The number of actors involved within Centralen Gothenburg is very high, which makes the system difficult for the researcher to understand. The "*Market model*" has been applied to the central station in Gothenburg: different parts of the technical system were outsourced and built separately to mimic a market. Each element of the station belongs to different actors: "The tracks are managed separately, as well as traffic management and traffic information; to run the trains themselves constitute another business, broken down by a growing number of different actors; command and information in the wagons handled by yet other companies; ongoing equipment maintenance of yet other actors; Station buildings, commercial space located in a separate company, while waiting rooms operated by another, with the exception of the platforms that are subject to the return of another player. There are some examples of how the system has been fragmented. There are also several different operators running the same traffic route" (Meijling 2014).

Jernhusen is a key player in the system and planning process in Gothenburg with considerable perceived power. This state-owned company "owns, develops and manages properties along the Swedish railway" (Jernhusen AB 2011). Its activities embrace both passenger transportation and freight.

Centralen meets today's travel demand and the future forecasts are taken into account in its development plans. The challenge remains the same—communication and collaboration among the stakeholders. From the brief exploration of Gothenburg's situation, improvement of the physical appearance of the station as well as the management system would help to contribute to SDG 11.2 to make it more safe, accessible, and sustainable.

3.3 Futures Methodologies in the Given Context

3.3.1 Futures Methodologies in the Planning Process

Futures methodologies are not obligatory elements of planning processes; however, they could be of great help. They allow stakeholders to see how the future could/should/would look, thus making the future more concrete. When conducting such studies, it is very important to figure out who your target stakeholders are (planners, companies involved, etc.), because it will affect how the results will be presented. The analyzed approaches of backcasting, foresighting, and SymbioCity are used for the same purpose of assisting the planning process, but they require different information and sometimes different procedures. They may also outline new perspectives.

The outcome of backcasting is a step-by-step strategy for sustainable development towards the vision shared by the stakeholders. At the same time, it is difficult to know the future possibilities and the process requires thorough selection of the experts for qualitative data collection. The forecasting methodologies (foresighting

and SymbioCity approaches) provide scenarios of how the future will look based on the current trends and historical data. In this case, it is difficult to avoid "locked-in" solutions and there might be a need for more expert contributions. Therefore, all three methodologies can be equally recommended to apply in the developmental process in general.

In the given context, the following points arose. Several authorities (Eising 2015; Nzomo 2015; Otieno 2015a) working with city development in Kenya mentioned during the interviews that it would be helpful to use foresighting or similar methodologies in their planning work. No universal approach would work for any environment. **It always depends on the local context.** That is why the three selected approaches are discussed below taking into account current state of the stations in Kenya and Sweden.

3.3.2 Kisumu

Based on the assessment of futures methodologies described above, only *foresighting* would be difficult to apply in Kisumu since it requires historical data, which are rarely documented. Thorough research on the previous performance would be necessary as the basis of the approach. The other two compared approaches (backcasting and SymbioCity) would be possible to apply in such environment. Their respective challenges and advantages are discussed below.

In case of *backcasting*, different level of education and different spoken languages (*Luo*,[9] *KiSwahili*[10] and English) could be a challenge in creating common ground among the stakeholders involved in the early stages of the process. The high number of key stakeholders that are important for the participatory workshop would make it even more complex. During the assessment of the current state, environmental, economic, social and spatial elements should be investigated, described, documented, and illustrated. The land issue would top the challenge list. Kisumu is a rapidly growing city and its transportation system is developing and evolving without official control. Various different means of transport create bigger demand for their services. The bus park is growing informally too, which makes the users (passengers as well as drivers) think that the only solution is bigger space for the bus park (based on the interviews and the survey). This topic would be one of the most sensitive among the stakeholders. To make the process inclusive, one would need to run several participatory workshops (on vision creation and discussion of the results). Nevertheless, using backcasting would ensure participation in the development process, creation of the shared vision among the stakeholders, and a concrete strategy towards the formulated goal. At the time of the study, backcasting had not been applied in Kenya, so using it would be a trial and might require adjustments due to the different culture.

Using the *SymbioCity* approach is also possible given the conditions in Kisumu. It is mainly used for city development; however, elements of the approach can be used on a smaller scale, such as the bus park. In fact, SymbioCity suggests using

[9] *Luo*—local language in the Lake Victoria region in Kenya and Tanzania.
[10] *KiSwahili*—first Kenyan national language, followed by English.

backcasting in the final stages: developing alternative solutions, evaluating their impacts, and integrating them further into the strategies.

Related to that, further challenges could be specification of the objectives, indicators, and targets. As mentioned before, for Kenya tomorrow is the future and actions of the government are reactive. If one is looking for solutions for the short term, SymbioCity could be a better option, although definition of "short term" has to be justified.

Depending on the main reason for using futures methodologies, the result could be a single solution or several solutions. If one desires a single answer—one way to go—SymbioCity would be a good option. However, if several alternative solutions are required in order to better understand what are the possibilities and opportunities, backcasting would be a better option.

When talking about development of the bus park, the scale is small in comparison to the city level (and deals mostly with one social problem despite the complexity); therefore, it would be easier and more "user-friendly" to apply the backcasting approach.

3.3.3 Gothenburg

For Centralen in Gothenburg, the SymbioCity approach would not be useful to apply. It has several dimensions which would not contribute to development, for example, building design and architecture. The station already has all the necessary constructions and building something additional would be use of materials, while sustainability often implies (depending on the local conditions) trying to avoid building new and using what already exists.

Backcasting and foresighting would be applicable in the given conditions of Centralen. Advantages and disadvantages are described below.

The challenge for using backcasting would be involvement of stakeholders. Their number is very high and even organizing a joint meeting could prove challenging. Nevertheless, backcasting provides creative solutions to existing problems and helps to avoid lock-ins. With the rapid development in the Nordic countries, backcasting would allow new ideas to develop based on possible trends, instead of relying on existing technologies. At the time of the study, backcasting had been applied in different sectors of Gothenburg city and municipality, which led to dialogue creation among the stakeholders and some innovative solutions.

Foresighting could also work in Gothenburg. However, since the results are based on historical data and the current situation, it might lead to unimaginative solutions.

Depending on what expectations from the futures methodologies are, foresighting could be helpful in order to see what the possible future of Centralen could look like, while backcasting would show what steps be undertaken to reach the envisioned future.

3.3.4 Futures Methodologies in Multisectoral Transitions Other Than Transportation

Three examples were investigated related to household nutrition, cities, and systemic change for sustainability and climate adaptation in coastal regions, where the main methodology used was participatory backcasting.

The Sustainable Household Nutrition (SHN) project as part of "Strategies towards the Sustainable Household (SusHouse)" took place between 1998 and 2000 in the Netherlands. It was followed up throughout the process, as well as its impact after 10 years. The project had a limited budget, which has been identified as one of the main reasons for low levels of active stakeholder participation and the project did not have follow-up activities when the application for future funding was rejected (Quist 2007).

Wolfram and Frantzeskaki (2016) examine the necessity of radical systemic changes in urban development in order to have sustainable development without crossing planetary boundaries. No matter what direction one would take and which indicators they choose to assess the results, the current planning processes require additional support of futures methodologies.

Another project combining backcasting and adaptive management was implemented in South Africa (van der Voorn et al. 2012). The authors underline the constraints of the current methodologies that are being applied for adaptation strategy creation. Therefore, the two above-mentioned methodologies have been combined. The proposed framework is suitable for application in the strategy and policy creation and has been tested in the Breede-Overberg coastal region.

The investigated cases show the need for alternative methodologies to support the planning process. The complexity of current challenges requires an interdisciplinary and multisectoral approach that would contribute to sustainable development transitions. Such an approach should also contribute to the policy-making process. Futures methodologies can be complementary to existing ones and the combinations with the other emerging disciplines can have a great positive impact on the sustainable transitions.

Funding is one key challenge in the follow-up after the implementation of futures methodologies. In case of Kenya, it is crucial. As was investigated during one of the interviews, depending on what the funding would become available for, the government would react correspondingly adjusting all the plans and current activities (Otieno 2015a). Similar attitude can be seen in the Netherlands with the SNH project, where stakeholders' activity was low due to the limited budget (Quist 2007).

4 Conclusion

The sharply different planning processes in Kenya and Sweden both have defined procedures; however, reality does not always correspond to the norms or rules.

As described before, Kisumu railway station has a revival plan, which is at the end of the first phase of implementation. The bus park, on the other hand, is not managed by any level of government—hence it is unique in terms of self-development. There is no plan for its development yet, hence there is a chance of incorporation of the appropriate SDG target. Several interviewees working with development planning mentioned the need for futures methodologies in their work (Eising 2015; Nzomo 2015; Otieno 2015a).

The transportation sector in Gothenburg has several approaches to sustainability integration at different levels. Nevertheless, our literature review and interviews show that planners are facing several challenges (Hellberg and Jonsson 2014; Isitt 2015; Kain 2015). That is why supportive methodologies could be useful for further development.

Futures methodologies can be applied to support the planning process. Depending on the local context, both backcasting and forecasting methodologies can be used. Backcasting would actually work in both the Kisumu and Gothenburg cases, since it can be applied at a small scale, it provides creative solutions and has a high level of integration of stakeholders. The modest study reported here has demonstrated its value, receiving a positive response from key interviewees in both cities.

Learning from the other fields, one can say that futures methodologies make a great contribution to the complex challenges that the world is facing and contribute to addressing several SDGs at the same time. Future development and adaptation to the local conditions would be the next steps in the research.

Acknowledgements The authors thank Chalmers University of Technology (Sweden), Maseno University (Kenya), Challenge Lab and Reality Studio in Kisumu for educational materials and support. Special thanks to Mistra Urban Futures, Blekinge Institute of Technology and UN-HABITAT (namely Silas Maujih) for their collaboration and establishment of new partnerships. Finally, financial support from Erasmus Mundus Master's Program, Trafikverket (Swedish transport administration) and Swedish Secretariat for Environmental Earth Sciences is greatly appreciated.

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Author Biographies

Varvara Nikulina has a master's degree in Industrial Ecology (Erasmus Mundus scholar: Karl-Franzens Universität Graz, Austria, Chalmers University of Technology, Sweden, 2015), MSc in Biophysics (Donetsk national university, Ukraine, 2009) graduate. She is currently a Ph.D. candidate at the Strategic Sustainable Development Department of Blekinge Institute of technology. Her research interests are strategic sustainability management, sustainable transportation solutions, and sustainability transition studies.

Henrikke Baumann is in the Environmental Systems Analysis Division, Energy and Environment Department, Chalmers University of Technology. Main scientific interests are research practices of life cycle thinking and environmental relations for life cycle studies; interdisciplinarity, capacity building, institutional development for interdisciplinary skills.

David Simon is Director of Mistra Urban Futures, Chalmers University of Technology, and Professor of Development Geography at Royal Holloway, University of London. His research encompasses principally the interface between development and the environment, in the context of sustainability and global environmental/climate change, especially relating to cities/urbanization and associated (geo)politics. His work integrates theory, policy, and practice at all scales, relating especially to Africa and the global South. Just as theory needs "grounding" in real-world conditions, applied research gains rigor from appropriate theoretically informed directions.

Frances Sprei is in the at Energy and Environment Department, Chalmers University of Technology. Her research assesses different personal mobility options, such as alternative fueled vehicles and electric vehicles as well as innovative mobility forms such as car sharing and ride sharing. Economic, political, technical, and behavioral aspects are taken into account. Her research methods are interdisciplinary combining quantitative methods such as econometrics with qualitative methods such as interviews.